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ABSTRACT

This report presents findings of a national mail survey of school principals conducted by the National Center for Education Statistics (NCES) in Spring 1982 to assess recent changes in computer availability and to obtain data about instructional uses and needs from the school perspective. Results are reported for the following topics addressed by the questionnaire: number of computers available for all uses (instructional and non-instructional) and for instructional use by students in the 1981-1982 school year; number of students using computers for instruction and the number of computer hours of instructional use in the 1981-1982 school year; relative amount of computer time devoted to various instructional purposes; number of teachers trained to teach computer literacy (introduction to computer concepts); number of credits that students could earn in computer literacy and computer science; need for and sources of microcomputer courseware; instructional software; and needs for initiating or improving computer-based education. Appendices include a discussion of the survey methodology and sampling errors and a copy of the survey questionnaire. (LMM)

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Instructional Use of Computers in Public Schools Spring 1982

National Center for Education Statistics

FRSS Report No. 14

IR011141

HIGHLIGHTS

- According to school administrators, 35 percent of the Nation's public schools used computers (microcomputers or computer terminals) for instruction in the 1981-82 school year. An additional number of schools (3 percent) had computers that were used strictly for noninstructional purposes.

- The availability of computer-based education varied by the instructional level of schools--from 22 percent of elementary schools to 74 percent of senior high schools.

- A total of 121,000 computer units were available for instructional use in 1981-82. Between fall 1980 and spring 1982, the number of computers used for instruction doubled; microcomputers, which tripled in number during that period, accounted for most of the increase.

- According to school administrators, 4.7 million students (11 percent of the public school enrollment) had access to computers for instruction in 1981-82. These students averaged 9 hours of computer time for instruction during that year.

- Computer usage varied by type of computer unit and by instructional level. The major application of microcomputers was for teaching computer literacy (introduction to computer concepts); the major use of terminals was for teaching computer science.

- Elementary schools made greater use of microcomputers for compensatory/remedial and basic skills instruction than did senior high schools, where computer science was the most prevalent instructional use.

- Almost half (46 percent) of the schools with microcomputers indicated a major need for microcomputer courseware in computer literacy and learning enrichment. Major courseware needs in compensatory/remedial and basic skills instruction were cited by 38 and 37 percent of the schools.

- Publishers were the major source of courseware for 26 percent of the schools with microcomputers, followed by vendors (21 percent), the school or district (18 percent), and other educational agencies (12 percent).

- More microcomputers and suitable courseware were perceived as the chief needs for initiating or improving computer-based education by over 60 percent of all schools. Qualified teachers and startup assistance were cited as major needs only slightly less frequently.

- Similar percentages of Title I schools and non-Title I schools (about 35 percent in each case) provided computer-based instruction to students. Title I authorized grants for elementary and secondary programs for children of low-income families. Non-Title I schools averaged more computers per school (4.7 vs. 3.7), but not more time of exposure per student (about 9 hours in each case).

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fast response survey system

Instructional Use of Computers in Public Schools Spring 1982

FRSS Report No. 14

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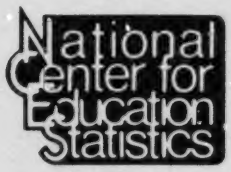

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"The purpose of the Center shall be to collect and disseminate statistics and other data related to education in the United States and in other nations. The Center shall . . . collect, collate, and, from time to time, report full and complete statistics on the conditions of education in the United States; conduct and publish reports on specialized analyses of the meaning and significance of such statistics; . . . and review and report on education activities in foreign countries."--Section 406(b) of the General Education Provisions Act, as amended (20 U.S.C. 1221e-1).

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FOREWORD

During the past decade, computers, especially personal microcomputers, have made a great impact on all aspects of American life--business and industry, government, leisure activities, and education. Recently, computers have started to have a major impact in the classroom as increasing numbers of schools have invested in the new technology.

This report presents findings of a national survey conducted by the National Center for Education Statistics (NCES) in spring 1982 to assess recent changes in computer availability and to obtain data about instructional uses and needs from the school perspective. The survey was conducted through the NCES Fast Response Survey System (FRSS), which was established to collect data on emerging educational developments. The preliminary results were first shared with the public in September 1982.

This report is the 14th in the FRSS series and will be useful to public education officials, as well as to concerned individuals and organizations in the private sector.

Marie D. Eldridge
Administrator

ACKNOWLEDGMENTS

This survey was conducted for the Assistant Secretary for Educational Research and Improvement, U.S. Department of Education, in support of the Secretary's technology initiative.

The survey was supported by the Council of Chief State School Officers (CCSSO) through its Committee for Evaluation and Information Systems (CEIS). The CEIS Fast Response Panel, chaired by Garth Yeager (Illinois) and composed of Charles Lloyd (Utah), George Malo (Tennessee), Margaret Bingham (North Carolina), and George Rush (CCSSO), offered numerous suggestions that improved the questionnaire.

A number of NCES staff contributed to this survey especially Jeanette Goor and Jean Brandes. The authors acknowledge with gratitude the assistance of the FRSS State Coordinators, who facilitated the data collection, and the respondents who voluntarily provided the data.

The survey was conducted by Westat, Inc., a research firm in Rockville, Maryland, under contract to NCES. The Westat project team included Dianne Walsh, John Burke, Frances Cohen, Lucinda Gray, and Patricia Congdon.

CONTENTS

	Page
HIGHLIGHTS	Inside Front Cover
FOREWORD	iii
ACKNOWLEDGMENTS	iv
INTRODUCTION	1
SURVEY FINDINGS	2
Availability of Computers	
Computer Availability in Public Schools in the 1981-82 School Year	2
Availability of Computer-Based Instruction, by School Characteristics	4
Extent of Computer Usage, by School Characteristics	6
Use of Computers	
Instructional Uses of Computers	8
Instructional Uses of Computers, by School Characteristics	9
Computer Literacy and Computer Science	11
Special Issues	
Needs for Microcomputer Courseware	12
Sources of Microcomputer Courseware	13
Needs for Initiating or Improving Computer-Based Education	14
Computer-Based Education in Title I and Non-Title I Schools	16
APPENDIXES:	
I. The Fast Response Survey System	18
Methodology for the Survey of Instructional Use of Computers in Public Schools	18
Standard Errors of the Statistics	20
II. Reproduction of Survey Questionnaire	Inside Back Cover

CONTENTS—Continued

TEXT TABLES

	Page
1.—Availability of computer units in public schools in 1981-82 and estimated availability in 1982-83: United States, spring 1982	3
2.—Availability of computer-based instruction in public schools during the 1981-82 school year, by school characteristics: United States, spring 1982	5
3.—Extent of computer usage for instruction in schools with computers, by school characteristics: United States, spring 1982	7
4.—Instructional usage of computers, by type of computer unit: United States, spring 1982	8
5.—Major allocation of computer time for instruction, by type of computer unit and school characteristics: United States, spring 1982	10
6.—Average number of teachers per school with computers for instruction who are qualified to teach computer literacy, by school characteristics: United States, spring 1982	11
7.—Major needs for microcomputer courseware in schools with computers, by school characteristics: United States, spring 1982	12
8.—Major sources of microcomputer courseware in schools with computers, by school characteristics: United States, spring 1982	13
9.—Major needs for initiating or improving computer-based education, by school characteristics: United States, spring 1982	15
10.—Comparison of the availability of computer-based education, usage, and needs in Title I and non-Title I schools: United States, spring 1982	17

APPENDIX TABLES

A.—Number of U.S. public schools in the universe and in the sample, by instructional level, region, and school type	19
B.—Standard errors of selected questionnaire items	21

INTRODUCTION

Microcomputers first appeared in public school classrooms in the late 1970's. By spring 1982, the number of microcomputers used by students for instruction had grown to almost 100,000—more than triple the number available just 18 months earlier.

This rapid increase in the number of microcomputers in schools is a reflection of the widespread interest by educators, parents, students, and society, generally, in the computer phenomenon.

In 1980, at the request of the Assistant Secretary for the Office of Educational Research and Improvement (OERI), the National Center for Education Statistics (NCES) conducted a survey of school districts on the instructional use of computers by students. One of the earliest national surveys on this topic, the study collected baseline data in support of the Secretary's technology initiative.

In spring 1982, the Assistant Secretary for OERI requested this current survey to provide a better understanding of computer-based education and needs at the school level. The questionnaire, which was sent to a nationally representative sample of public schools, obtained the following information:

- Numbers of computers[1] available for all uses (instructional and non-instructional) and for instructional use by students in the 1981-82 school year.
- Number of students using computers for instruction, and the number of computer hours of instructional use in the 1981-82 school year.
- Relative amount of computer time devoted to various instructional purposes.
- Number of teachers trained to teach computer literacy (introduction to computer concepts).
- Number of credits that students could earn in computer literacy and computer science.
- Needs for and sources of microcomputer courseware (instructional software).
- Needs for initiating or improving computer-based education.

The estimates in this report are based on sample data that have been weighted to produce national estimates. Because these estimates are subject to sampling variability, the numbers in the text have been rounded; however, the numbers in the tables are the actual estimates. Percents have been calculated based on the actual estimates rather than the rounded values.

The methodology for this survey and sampling errors are discussed in appendix I; the survey questionnaire, which was mailed to the school principal, is presented in appendix II.

[1] Computers were defined in this survey as either small, self-contained personal computers with TV-like screens (microcomputers) or the more traditional computer terminals connected to remote central processors.

SURVEY FINDINGS

Computer Availability in Public Schools in the 1981-82 School Year

About two-fifths (38 percent) of the Nation's public schools had one or more computers during the 1981-82 school year (see table 1). Almost all of these schools (93 percent) provided computer-based instruction.

Public schools had access to an estimated total of 132,000 computer units, of which 91 percent (121,000) were used for instruction. The number of computers available for instruction more than doubled in public schools between fall 1981 (52,000 computers) and spring 1982. Most of the growth occurred in the number of microcomputers (from 31,000 to 96,000), while the number of computer terminals did not change significantly (22,000 vs. 24,000).

School administrators projected a modest growth in the availability of computer-based education for the 1982-83 school year (table 1), but their projections have proved to be too conservative.[2] After these estimates were made, funds from Chapter 2 of the Education Consolidation and Improvement Act became available to school districts. A recent study by the American Association of School Administrators indicates that many districts are utilizing their Chapter 2 funds to purchase microcomputers for their schools.[3]

The remainder of the report focuses exclusively on computers used for instructional purposes. Tables in the following sections present national estimates for all schools and for schools classified according to instructional level (elementary, junior high, senior high, and combined and other[4]), geographical region, and metropolitan status (urban, suburban, rural). The final section compares the availability of computer-based instruction in Title I and non-Title I schools. Throughout the report, when averages per school or averages per student are discussed, the reference is with respect to schools offering computer-based instruction.

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[2] Becker, Henry, "School Uses of Microcomputers," Center for Social Organization of Schools, Johns Hopkins University, April 1983.

[3] "Impact of Chapter 2 of the Education Consolidation and Improvement Act on Local Education Agencies," American Association of School Administrators, March 1983.

[4] Combined and other schools include those with combined elementary and secondary grades, as well as all special education and vocational education schools. The findings for these schools are presented, but are not discussed in the text because this group of schools is relatively small (5,874 out of 81,970 schools) and very diverse.

Table 1.--Availability of computer units in public schools in 1981-82 and estimated availability in 1982-83: United States, spring 1982

Computer availability	Schools with computer units		Number of computer units	Average number of computer units per school
	Number	Percent[1]		
1981-82 school year				
All applications:				
Microcomputers	28,959	35	101,987	3.5
Terminals	8,848	11	30,472	3.4
Either microcomputers or terminals or both	31,068	38	132,459	4.3
Instructional use:				
Microcomputers	27,501	34	96,462	3.5
Terminals	5,898	7	24,446	4.1
Either microcomputers or terminals or both	29,028	35	120,908	4.2
1982-83 school year				
All applications:				
Microcomputers	37,053	45	156,269	4.2
Terminals	10,363	13	34,826	3.4
Either microcomputers or terminals or both	38,573	47	191,095	5.0
Instructional use:				
Microcomputers	34,847	43	146,065	4.2
Terminals	6,803	8	27,155	4.0
Either microcomputers or terminals or both	36,181	44	173,220	4.8

[1] Percentages are based on an estimated 81,970 schools that were in-scope and operational at the time of the survey.

Availability of Computer-Based Instruction, by School Characteristics

The 29,000 schools providing computer-based education in 1981-82 possessed 121,000 computers, an average of 4.2 computers per school with computers (table 2). The number of computers available for instruction in individual schools varied greatly; the majority of schools (56 percent) had only one or two units, while 10 percent had 10 or more (not on table).

Both the percent of schools offering computer-based education and the average number of computers per school increased as the instructional level increased. One-fifth (22 percent) of the elementary schools used computers for instruction, compared with 52 percent of the junior high schools and 74 percent of the senior high schools. Elementary schools providing computer-based instruction averaged 2.3 computers per school, while senior highs averaged 6.0. Part of the difference in the number of computers per school may be related to school size as well as instructional level, since secondary schools tend to be larger than elementary schools. For example, about three-fifths of senior high schools have enrollments of 500 or more students, compared with 28 percent of the elementary schools.

Regional availability of computer-based education ranged from 27 percent of the schools in the Southeast region to about 40 percent of the schools in both the North Atlantic region and the Great Lakes and Plains region. The concentration of computers in these schools varied as well—from 2.7 units per school in the Southeast region to 5.8 per school in the West and Southwest region.

Approximately equal proportions of urban, suburban, and rural schools used computers for instruction in 1981-82 (between 33 and 37 percent). However, urban schools with computers averaged more computers per school (6.8) than did suburban (3.9) or rural (3.0) schools.

Administrators in senior high schools also reported the percentage of their graduates who attend college. Schools were classified into three groups: low (25 percent or less), medium (26 to 60 percent), or high (more than 60 percent). Schools with a high percent of graduates attending college were more likely to offer computer-based education (88 percent) than were schools with a low percent of graduates going to college (37 percent); about three-fourths (73 percent) of the schools in the middle group had computer-based instruction. The numbers of computers available for instruction ranged from 4.7 in the low group to 7.0 in the high group.

Table 2.--Availability of computer-based instruction in public schools during the 1981-82 school year, by school characteristics: United States, spring 1982

School characteristics	All schools	Schools providing computer-based instruction[1]		Number of computer units[2] used for instruction	Average number of computer units per school with computers
		Number	Percent[3]		
All schools	81,970	29,028	35	120,908	4.2
Instructional level:					
Elementary	50,800	11,364	22	26,258	2.3
Junior high	11,184	5,822	52	27,590	4.7
Senior high	14,113	10,445	74	62,290	6.0
Combined and other ..	5,874	1,396	24	4,769	3.4
Region:					
North Atlantic	16,398	6,433	39	27,941	4.3
Great Lakes and Plains	24,472	9,848	40	34,394	3.5
Southeast	18,301	4,967	27	13,607	2.7
West and Southwest ..	22,800	7,780	34	44,966	5.8
Metropolitan status:[4]					
Urban	19,857	6,490	33	43,932	6.8
Suburban	24,487	9,009	37	35,568	3.9
Rural	36,433	13,400	37	40,837	3.0

[1] With microcomputers, computer terminals, or both.

[2] Computer units include both microcomputers and computer terminals.

[3] Based on all schools in each category.

[4] Schools are classified as urban, suburban, or rural based on their ZIP codes. Urban schools have ZIP codes that comprise the central city portion of a Standard Metropolitan Statistical Area (SMSA) as defined by the Census Bureau. Suburban schools lie within an SMSA, but outside the central city. Rural schools lie outside SMSA's. Information on metropolitan status was not available for an estimated 1,183 schools, 129 of which provided computer-based education. These schools were excluded from the counts and percentages for metropolitan status.

Note.--Numbers may not add to totals because of rounding.

Extent of Computer Usage, by School Characteristics

In the 1981-82 school year, 4.7 million public school students (11 percent) received instruction using computers. On the average, each of the 121,000 computers was used for instruction a total of 361 hours during the year (about 2 hours per school day). Each computer was shared by an average of 39 students, and each student in schools with computers averaged 9 hours of computer access in 1981-82 (table 3).

Computer usage varied widely, however, among schools offering computer-based instruction. For example, about 10 percent of the schools used their computers 50 hours or less during 1981-82 (about 17 minutes per day), while 13 percent used their computers 900 hours or more (5 hours per day). Similar variations occurred regarding the length of student exposure to computers. Students in 10 percent of the schools received 1 1/3 hours or less of computer instruction during the 1981-82 school year; at the other end of the scale, students in another 10 percent of schools received 36 hours or more of computer instruction during the year, or 1 hour per week.

It is interesting to note that while proportionately more senior high schools provided computer-based instruction than did elementary schools (table 2), students attending elementary schools that offered computer-based instruction were more likely to receive some exposure to computers than were students attending senior high schools that offered such instruction (not on table). Although only 9 percent of all elementary school students nationwide received instruction using computers in 1981-82, fully 35 percent of students in elementary schools with computers received such instruction. At the senior high level, however, 15 percent of all students received computer-based instruction, but only 17 percent of students in schools with computers had received the instruction.

Approximately the same number of elementary and senior high school students received computer instruction in 1981-82 (1.7 million students at each level). Further, each computer at the two levels was utilized for instruction about the same amount of time (400 and 370 hours, for elementary and senior high school computers, respectively). However, as seen in table 2, senior high schools had more than twice as many computer units as elementary schools. Consequently, the student to computer ratio was smaller at the senior high level (28) than at the elementary level (66). Also, senior high school students received a more concentrated exposure to computer-based instruction (13 hours per student in 1981-82), compared with elementary school students (6 hours per student).

The average number of students per computer did not differ significantly by geographical region. The average exposure per student, however, ranged from 7 hours in the Southeast to 12 hours in the Great Lakes and Plains.

Table 3.--Extent of computer usage for instruction in schools with computers, by school characteristics: United States, spring 1982

School characteristics	Schools providing computer-based education[1]	Average number of hours per computer in 1981-82	Average number of students per computer	Average number of hours per student in 1981-82
All schools	29,023	360.7	39.1	9.2
Instructional level:				
Elementary	11,364	399.3	65.5	6.1
Junior high	5,822	323.5	43.7	7.4
Senior high	10,445	367.9	27.9	13.2
Combined and other	1,396	249.9	12.7	19.8
Region:				
North Atlantic	6,433	336.8	37.5	9.0
Great Lakes and Plains ..	9,848	480.7	39.1	12.3
Southeast	4,967	282.9	42.9	6.6
West and Southwest	7,780	305.6	38.8	7.9
Metropolitan status:[2]				
Urban	6,490	383.6	36.4	10.5
Suburban	9,009	397.9	50.5	7.9
Rural	13,400	308.1	31.1	9.9

[1] With microcomputers, computer terminals, or both. Numbers may not add to total because of rounding.

[2] Information on metropolitan status was not available for an estimated 129 schools providing computer-based education. These schools have not been included in the estimates for metropolitan status.

Instructional Uses of Computers

A basic dichotomy exists in the instructional purposes for which computers are put to use in public schools. When used for compensatory/remedial education, teaching basic academic skills, or learning enrichment, the computer is a novel tool that is utilized to accomplish a traditional end. When used to teach computer literacy or computer science, the computer, no longer merely a tool, becomes the subject matter.

Teaching computer literacy was the most prevalent instructional use of microcomputers in public schools, with an estimated 33 percent of all schools with microcomputers devoting a major percentage of total microcomputer time to this purpose (table 4). Nearly two-thirds of the schools with microcomputers (64 percent) reported major or moderate usage for this purpose, and only 15 percent did not offer any instruction in computer literacy.

Twenty-three percent of the schools reported that teaching computer science was a major use of microcomputers; only 16 percent, however, indicated moderate usage of microcomputers for computer science instruction, and 37 percent indicated no computer science instruction. Learning enrichment and basic academic skills instruction were mentioned as major microcomputer uses by 19 percent of the schools; about one-half of the schools made major or moderate usage of their microcomputers for these purposes (54 and 49 percent, respectively).

For schools with terminals, computer science was the most emphasized instructional purpose, with 34 percent of schools reporting major usage. Major usage of terminals for other instructional purposes ranged from 24 percent for learning enrichment to 12 percent for compensatory/remedial instruction.

Table 4.--Instructional usage of computers, by type of computer unit: United States, spring 1982

Instructional purpose	Relative amount of total computer time[1]			
	Percent major	Percent moderate	Percent little	Percent none
Microcomputers:				
Compensatory/remedial	14	25	28	32
Basic academic skills	19	30	28	23
Learning enrichment	19	35	30	16
Computer literacy	33	31	21	15
Computer science	23	16	24	37
Computer terminals:				
Compensatory/remedial	12	13	27	47
Basic academic skills	13	24	23	40
Learning enrichment	24	29	22	25
Computer literacy	22	27	18	32
Computer science	34	22	10	34

[1] Percentages for microcomputers are based on an estimated 27,501 schools offering computer-based instruction via microcomputers, while percentages for terminals are based on 5,898 schools with computer terminals. Of the estimated 29,028 schools offering computer-based instruction with either microcomputers or terminals or both, 23,130 have microcomputers only, 1,527 have terminals only, and 4,371 have both microcomputers and terminals.

Note.--Row percents may not add to 100 because of rounding.

Instructional Uses of Computers, by School Characteristics

The major allocation of microcomputer time for instruction varied by instructional level. In elementary and junior high schools, computer literacy was more frequently a major instructional use of microcomputers than was computer science; in senior high schools, the pattern was reversed (table 5). Nearly half (49 percent) of senior high schools allocated a major amount of microcomputer time for instruction in computer science, while 39 percent did so for computer literacy. Microcomputers were used more often as a tool to teach traditional subjects in elementary schools than in senior high schools. They were used heavily to teach basic academic skills in 29 percent of elementary schools, compared with only 12 percent of senior high schools.

Computer literacy was the most prevalent major instructional purpose of microcomputers in the North Atlantic (30 percent) and Great Lakes and Plains (31 percent), as well as in suburban areas (37 percent) and rural areas (31 percent).

Most of the observed differences in terminal usage by school characteristics were not significant because the sample number of schools with terminals was small. For example, although major terminal use for computer literacy and learning enrichment in urban schools differed by 17 percent based on this sample, the difference was not statistically significant.

Table 5.--Major allocation of computer time for instruction, by type of computer unit and school characteristics: United States, spring 1982

School characteristics	Schools providing computer-based education	Instructional purpose[1]				
		Compensatory/ remedial	Basic academic skills	Learning enrichment	Computer literacy	Computer science
1	2	3	4	5	6	7
Microcomputers		(In percents of column 2)				
All schools	27,501	14	19	19	33	23
Instructional level:						
Elementary	11,050	18	29	21	29	7
Junior high	5,774	20	11	19	30	10
Senior high	9,504	6	12	18	39	49
Combined and other	1,173	19	6	4	34	15
Region:						
North Atlantic	6,213	13	15	11	30	17
Great Lakes and Plains ..	9,224	14	20	15	31	23
Southeast	4,620	12	12	29	40	25
West and Southwest	7,444	17	24	24	33	25
Metropolitan status:[2]						
Urban	5,887	24	26	17	31	21
Suburban	8,610	9	12	20	37	25
Rural	12,874	13	19	19	31	22
Computer terminals						
All schools	5,898	12	13	24	22	34
Instructional level:						
Elementary	958	23	20	28	0	0
Junior high	978	28	10	23	23	14
Senior high	3,620	6	13	21	28	47
Combined and other	343	0	0	50	15	45
Region:						
North Atlantic	1,273	7	0	20	14	51
Great Lakes and Plains ..	2,319	8	5	27	37	27
Southeast	773	0	37	16	13	30
West and Southwest	1,553	28	22	28	12	33
Metropolitan status:[2]						
Urban	2,034	20	4	30	24	47
Suburban	1,827	2	9	20	24	29
Rural	1,999	12	25	23	20	26

[1] Respondents could indicate zero, one, or more than one major instructional purpose.

[2] Information on metropolitan status was not available for an estimated 129 schools providing computer-based education (excluded from this analysis).

Computer Literacy and Computer Science

In addition to providing information on the relative amount of computer time devoted to computer literacy and computer science, school administrators supplied information on the number of credits that students could earn in these subjects (if applicable) and on the number of teachers who were highly, moderately, or minimally qualified to teach computer literacy.

Over four-fifths of the senior high schools with computers offered some instruction in computer literacy (88 percent) or computer science (85 percent) using either microcomputers or computer terminals. According to administrators, credit courses were available in 58 percent of the senior high schools offering computer literacy; on the average, students in these schools could earn 1.9 credits in computer literacy. Three-fourths of the senior highs with computer science instruction offered credit courses in the subject; on the average, 2.4 credits could be earned.

Despite the widespread availability of computer literacy instruction in schools with computers, there were relatively few teachers who were highly trained to teach computer literacy. Administrators estimated that 37,000 teachers were highly qualified to teach computer literacy, an average of 1.3 teachers per school with computers (table 6). However, 44 percent of the schools with computers had no teachers who were highly qualified, while a small fraction (4 percent) had 5 or more. Moderately and minimally qualified teachers in 1981-82 numbered 55,000 and 122,000; per school averages were 1.9 and 4.2, respectively.

By school characteristics, the numbers of highly trained teachers ranged from .7 teachers per school in combined and other schools with computers to 1.6 per senior high school and schools in the North Atlantic.

Table 6.--Average number of teachers per school with computers for instruction who are qualified to teach computer literacy, by school characteristics: United States, spring 1982

School characteristics	Average number of teachers who are qualified			
	Highly	Moderately	Minimally	Total
All schools	1.3	1.9	4.2	7.4
Instructional level:				
Elementary	1.1	2.1	3.8	7.0
Junior high	1.2	2.0	4.6	7.8
Senior high	1.6	1.8	4.8	8.2
Combined and other	.7	.8	1.4	2.9
Region:				
North Atlantic	1.5	2.2	5.3	9.1
Great Lakes and Plains	1.2	2.3	4.5	8.0
Southeast	.9	1.3	2.0	4.2
West and Southwest	1.4	1.5	4.5	7.4
Metropolitan status:[1]				
Urban	1.5	2.6	4.7	8.8
Suburban	1.5	2.4	4.7	8.6
Rural	1.0	1.3	3.5	5.8

[1] Information on metropolitan status was not available for an estimated 129 schools providing computer-based education (excluded from this analysis).

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Needs for Microcomputer Courseware

The leading courseware needs were in the fields of computer literacy and learning enrichment; each was reported as a major need by 46 percent of the schools with microcomputers (table 7). Courseware for compensatory/remedial and basic skills instruction were regarded as major needs by 38 and 37 percent, respectively, of the school administrators. When ratings of moderate need were included, courseware needs ranged from 77 percent for compensatory/remedial instruction to 90 percent for learning enrichment.

At the elementary level, software needs for compensatory/remedial and basic skills instruction were similar to those for learning enrichment and computer literacy. Administrators in senior highs, however, regarded computer literacy courseware as a greater need than courseware for either basic skills or compensatory/remedial instruction.

Some regional differences emerged in the need for microcomputer software. For example, only about one-fourth of the North Atlantic schools reported a major need for basic skills courseware, compared with almost half of the schools in both the Southeast and West and Southwest. Administrators in schools in the Southeast also perceived the need for learning enrichment courseware more strongly than administrators in the Great Lakes and Plains region.

Table 7.--Major needs for microcomputer courseware in schools with computers, by school characteristics: United States, spring 1982

School characteristics	Schools with microcomputers for instruction	Major microcomputer courseware needs[1]			
		Compensatory/ remedial	Basic academic skills	Learning enrichment	Computer literacy
1	2	3	4	5	6
		(In percents of column 2)			
All schools	27,501	38	37	46	46
Instructional level:					
Elementary	11,050	42	40	49	42
Junior high	5,774	36	35	46	42
Senior high	9,504	32	34	41	51
Combined and other	1,173	58	50	55	53
Region:					
North Atlantic	6,213	43	24	45	49
Great Lakes and Plains ..	9,221	36	34	37	40
Southeast	4,620	48	47	55	56
West and Southwest	7,444	30	46	51	45
Metropolitan status:[2]					
Urban	5,887	47	39	42	45
Suburban	8,610	35	37	49	45
Rural	12,874	36	37	45	47

[1] Respondents could indicate zero, one, or more than one major courseware need.

[2] Information on metropolitan status was not available for an estimated 129 schools providing computer-based education (excluded from this analysis).

Sources of Microcomputer Courseware

About one-fourth of the schools with microcomputers obtained all or most of their software from publishers (table 8). Vendors were the chief sources of courseware for 21 percent of the schools, and 18 percent relied mainly on courseware developed within the school or district. Other education agencies were the least frequent of the four listed sources of software.

With a few exceptions, chief courseware sources did not differ by the instructional level or metropolitan status of schools; they did differ, however, by geographical region. Almost one-fourth of the schools in the Great Lakes and Plains region reported that other education agencies supplied all or most of their software. In the other regions, other education agencies were a major software source for only 4 to 9 percent of the schools with microcomputers. This difference probably reflects the impact of computing consortia, such as the Minnesota Educational Computing Consortium (MECC), which has been developing and disseminating instructional software in the Midwest for 10 years.

Differences in the utilization of courseware sources also occurred within regions. For example, Great Lakes and Plains schools with microcomputers obtained courseware significantly more often from publishers than from vendors. For schools in the West and Southwest, however, vendors were the most frequent major supplier of courseware.

Table 8.--Major sources of microcomputer courseware in schools with computers, by school characteristics: United States, spring 1982

School characteristics	Schools with microcomputers for instruction	Major sources of microcomputer courseware[1]			
		Publishers	Vendors	School/district	Other educational agencies
1	2	3	4	5	6
		(In percents of column 2)			
All schools	27,501	26	21	18	12
Instructional level:					
Elementary	11,050	30	13	18	10
Junior high	5,774	24	30	16	14
Senior high	9,504	23	21	20	12
Combined and other	1,173	34	41	16	19
Region:					
North Atlantic	6,213	31	24	18	5
Great Lakes and Plains	9,224	29	10	17	23
Southeast	4,620	32	21	24	4
West and Southwest	7,444	15	32	15	9
Metropolitan status:[2]					
Urban	5,887	21	24	20	11
Suburban	8,610	32	24	17	10
Rural	12,874	26	17	18	13

[1] Respondents could indicate zero, one, or more than one major source of microcomputer courseware.

[2] Information on metropolitan status was not available for an estimated 129 schools providing computer-based education (excluded from this analysis).

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Needs for Initiating or Improving Computer-Based Education

According to school administrators, more microcomputers and suitable courseware are the chief needs for initiating or improving computer-based education. Over 60 percent of all administrators rated these needs as having major importance (table 9). About half of the administrators regarded qualified teachers and startup assistance as major needs, while 41 percent cited staff/community support.

Major needs of schools already providing computer-based education differed from those of schools without computers. Administrators in schools with computers were more likely to stress the need for more microcomputers and suitable courseware compared with administrators in schools without computers. On the other hand, proportionately more schools without computers cited startup assistance, qualified teachers, and staff/community support as major needs.

Some of the differences of needs by instructional level reflected the differences in availability of computer-based education by instructional level. For instance, compared with elementary schools, senior highs were less likely to rate startup assistance as a major need and more likely to regard more microcomputers as critical. In fact, administrators in senior high schools viewed the need for more microcomputers as even more important than the need for courseware.

Ratings of needs by geographical region and by metropolitan status generally showed the same pattern as national ratings.

Table 9.--Major needs for initiating or improving computer-based education, by school characteristics: United States, spring 1982

School characteristics	All schools	Major needs for improving computer-based education[1]				
		Start-up assistance	Qualified teachers	More micro-computers	Suitable course-ware	Staff/ community support
1	2	3	4	5	6	7
		(In percents of column 2)				
All schools	81,970	49	50	63	62	41
Instructional level:						
Elementary	50,800	52	52	58	61	41
Junior high	11,184	55	56	78	70	48
Senior high	14,113	35	44	77	61	41
Combined and other ...	5,874	39	29	48	49	21
Region:						
North Atlantic	16,398	49	53	69	69	37
Great Lakes and Plains	24,472	53	47	62	63	35
Southeast	18,301	45	52	60	59	50
West and Southwest ...	22,800	47	49	62	57	42
Metropolitan status:[2]						
Urban	19,857	53	58	68	65	44
Suburban	24,487	52	50	63	66	41
Rural	35,443	45	46	60	57	39

[1] Respondents could indicate zero, one, or more than one major need for improving computer-based education.

[2] Information on metropolitan status was not available for an estimated 1 183 schools (excluded from this analysis).

Computer-Based Education in Title I and Non-Title I Schools

School administrators also indicated whether their school received Title I assistance. Title I authorized grants for elementary and secondary school programs for children of low-income families. Table 10 compares the availability of computer-based education, usage, and needs in Title I and non-Title I schools. Similar percentages of Title I and non-Title I schools—35 percent of all Title I schools and 36 percent of non-Title I schools—had computers available for instruction in 1981-82. Although non-Title I schools averaged more computers per school than Title I schools (4.7 vs. 3.7), no significant differences occurred for students per computer (42.6 vs. 35.7) or hours of exposure per student (9.2 vs. 9.3).

Differences did show up in the uses of microcomputers. Title I schools were more likely to allocate a major portion of their microcomputer time for compensatory/remedial education (19 percent vs. 9 percent) than were non-Title I schools. Title I schools also were more likely to indicate a major need for courseware for this instructional purpose. Non-Title I schools emphasized teaching computer literacy and computer science to a greater extent than Title I schools did. Two out of five non-Title I schools spent a major portion of their microcomputer time on computer literacy, compared with only one-fourth of the Title I schools. The size of difference was similar for computer science: 31 percent of non-Title I schools versus 16 percent of Title I schools allocated a major portion of their total microcomputer time to this purpose.

Regarding major needs for initiating or improving computer-based education in their schools, Title I and non-Title I schools differed only in the extent to which they viewed the need for more microcomputers. Administrators in 68 percent of the non-Title I schools regarded obtaining more microcomputers as a major need, compared with 60 percent of the administrators in Title I schools.

Table 10.--Comparison of the availability of computer-based education, usage, and needs in Title I and non-Title I schools: United States, spring 1982

Item	Title I schools	Non-Title I schools
All schools	44,164	36,901
Schools with either microcomputers or terminals for instruction	15,268	13,303
Number of microcomputers and terminals for instruction	56,404	62,505
In schools with computers:		
Average number of computer units for instruction per school.	3.7	4.7
Average number of students per computer	35.7	42.6
Average number of hours per computer in 1981-82	331.8	392.4
Average number of hours per student in 1981-82	9.3	9.2
Percent of schools with microcomputers indicating major allocation of microcomputer time for:[1]		
Compensatory/remedial	19	9
Basic academic skills	20	18
Learning enrichment	17	21
Computer literacy	25	40
Computer science	16	31
Percent of schools with microcomputers indicating major need for courseware for:[1]		
Compensatory/remedial	44	32
Basic academic skills	41	33
Learning enrichment	42	49
Computer literacy	42	50
Percent of all schools indicating the following as major needs for initiating or improving computer-based education:[1]		
Startup assistance	47	51
Qualified teachers	48	53
More microcomputers	60	68
Suitable courseware	60	64
Staff/community support	42	40

[1] Respondents could indicate zero, one, or more than one major category for this question.

Note.--Information on Title I status was not available for an estimated 905 schools (excluded from this analysis).

Appendix I

The Fast Response Survey System

The Fast Response Survey System (FRSS) was established by NCES so that education data, urgently needed for planning and policy formulation, could be collected quickly and with minimum burden on respondents.

The FRSS covers six education sectors:

State Education agencies (SEA's)
Local education agencies (LEA's)
Public elementary and secondary schools
Private elementary and secondary schools
Institutions of higher education
Noncollegiate postsecondary schools with occupational programs.

All 50 States and the District of Columbia are included in the SEA sector. For each of the other sectors, a stratified random sample was designed to allow valid national estimates to be made. The sample sizes range from 500 to 1,000.

A data-collection network involving both respondents and coordinators was developed in each sector. Coordinators assist in the data collection by maintaining liaison with the sampled institutions or agencies. The respondents, selected to report for their institutions or agencies, voluntarily provide the policy-oriented data requested in the questionnaires.

The FRSS provides NCES with a mechanism for furnishing data quickly and efficiently. All aspects of the system--the sample design, the network of coordinators and respondents, and the short questionnaires--have been designed with this end in mind.

Methodology for the Survey of Instructional Use of Computers in Public Schools

This study was based on a stratified national sample of 900 public schools. The universe used to select the sample was a file of approximately 82,300 public school buildings compiled in October 1981 by Market Data Retrieval, Inc. (Westport, Connecticut). In order to increase efficiency, schools identified on the file as having microcomputers were sampled separately and at a higher rate than the remaining schools. Additional stratification was based on instructional level, building enrollment, geographical region, district enrollment, and metropolitan status.

After adjusting for school closings and out-of-scope selections, the number of potential respondents was 896, representing a total of 81,970 public schools. Questionnaires were mailed to these respondents in April 1982. Data collection by mail and telephone continued until a 92 percent response (825 questionnaires) was obtained.

The response data were weighted to produce national estimates, and a weight adjustment was made to account for survey nonresponse. The adjustments were calculated for each cell of a three-way tabulation of microcomputer indicator by instructional level by region. Table A shows the cell totals used in the weighting. The data were not adjusted for item nonresponse, which was quite small (ranging from less than 1 percent to 2.4 percent).

Table A.--Number of U.S. public schools in the universe and in the sample, by instructional level, region, and school type

Instructional level and school type[1]	Region							
	North Atlantic		Great Lakes and Plains		Southeast		West and Southwest	
	Universe	Sample	Universe	Sample	Universe	Sample	Universe	Sample
Elementary:								
Schools with microcomputers.....	1,267*	29	2,066	44	732	15	1,448	33
Schools without microcomputers..	9,383	63	12,874	95	10,187	68	12,842	93
Junior high:								
Schools with microcomputers.....	645	17	844	19	415	10	868	18
Schools without microcomputers..	1,686	13	2,278	17	2,042	11	2,406	18
Senior high:								
Schools with microcomputers.....	1,503	34	2,330	55	1,028	23	1,540	36
Schools without microcomputers..	990	8	2,163	17	2,042	15	2,517	16
Combined and other:								
Schools with microcomputers.....	197	6	513	10	159	3	166	5
Schools without microcomputers..	727	4	1,403	10	1,696	14	1,013**	6

*Adjusted down from 1,348 to account for two school closings.

**Adjusted down from 1,274 to account for two out-of-scope units.

[1]The source of the universe file was Market Data Retrieval/CIC Data Base, fall 1981. In compiling the data base, MDR identified each school either as having a microcomputer for instruction or not.

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Standard Errors of the Statistics

The findings presented in this report are estimates based on the FRSS sample of public schools and, consequently, are subject to sampling variability. If the questionnaire had been sent to a different sample, the responses would not have been identical; some estimates might have been higher, while others might have been lower. The estimated standard error of a statistic (a measure of the variation due to sampling) can be used to examine the precision obtained in a particular sample. If all possible samples were surveyed under similar conditions, intervals of 1.645 standard errors below to 1.645 standard errors above a particular statistic would include the average result of these samples in approximately 90 percent of the cases. For example, for the number of computers available for instruction (table B), the 90 percent confidence interval is from 107,355 to 134,461 computers (120,908 $\pm$ 1.645 times a standard error of 8,239). If the above procedure were followed for every possible sample, about 90 percent of the intervals would include the average number from all possible samples.

Table B presents standard errors (calculated by balanced repeated replication) for selected questionnaire items. Specific statements of comparison in the text are significant at least at the 80 percent confidence level, and most are significant at the 90 percent level. Standard errors for other questionnaire items and statistics presented in this report, not included in table B, can be obtained on request.

Table B.--Standard errors of selected questionnaire items

Item	Estimate	Standard error
National totals, averages, and percents:		
Percent of schools providing computer-based education	35	1.7
Total number of computers available for instruction	120,908	8,239
Total number of microcomputers available for instruction	96,462	7,418
Average number of computers per school with computers	4.2	.3
Percent of all schools with microcomputers indicating major use for:		
Compensatory/remedial	14	2.1
Basic academic skills	19	2.6
Learning enrichment	19	2.2
Computer literacy	33	3.0
Computer science	23	2.6
Percent of all schools with terminals indicating major use for:		
Compensatory/remedial	12	4.1
Basic academic skills	13	4.5
Learning enrichment	24	5.2
Computer literacy	22	5.0
Computer science	34	5.1
Percent of all schools with microcomputers indicating major courseware need for:		
Basic academic skills	37	2.9
Computer literacy	46	3.5
Percent of all schools with microcomputers indicating major source of courseware from:		
Publishers	26	3.3
Other educational agencies	12	1.9
Percent of all schools indicating the following as major needs for initiating or improving computer-based education:		
Startup assistance	49	1.8
Qualified teachers	50	1.9
More microcomputers	63	1.9
Suitable courseware	62	2.0
Staff/community support	41	1.8
Percents and averages by school characteristics:		
Percent of elementary schools providing computer-based education	22	1.7
Percent of senior high schools providing computer-based education	74	4.1
Average number of computers per elementary school with computers	2.3	.2
Average number of computers per senior high school with computers	6.0	.4
Average number of computers per school with computers in the West and Southwest	5.8	.9
Percent of elementary schools with microcomputers indicating major use for basic academic skills	29	4.3
Percent of senior high schools with microcomputers indicating major use for basic academic skills	12	3.7
Percent of Great Lakes and Plains schools with microcomputers indicating major use for computer literacy	31	4.2
Percent of Southeast schools with microcomputers indicating major use for computer literacy	40	6.4
Percent of urban schools with microcomputers indicating major use for computer literacy	31	5.6
Percent of rural schools with microcomputers indicating major use for computer literacy	31	3.9

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SURVEY OF INSTRUCTIONAL USE OF COMPUTERS IN PUBLIC SCHOOLS

This report is authorized by law (20 U.S.C. 1221e-1). While you are not required to respond, your cooperation is needed to make the results of this survey comprehensive, accurate, and timely.

Definitions for this survey

- Microcomputers: small, self-contained, "personal" computers costing about $5,000 or less, and including at least a TV-like screen and typewriter keyboard.
- Terminals: input/output devices connected to a larger, remote central processor.
- Computer units: Microcomputers or terminals.
- Instructional use: INCLUDE only computers used interactively by students for instructional purposes, e.g., basic academic skills, learning enrichment, computer literacy.

1. Enter the number of each type of computer unit used at your school during the 1981-82 school year and the number expected to be used in the 1982-83 school year. If your school has no computer units in the 1981-82 school year and does not plan to have any in the 1982-83 school year, enter "0" on line A only and skip to Question 6.

Computer application	Number in 1981-82		Total number in 1982-83	
	Micro-computers	Terminals	Micro-computers	Terminals
A. All applications (instructional and non-instructional)	102,000	30,000	156,000	35,000
B. Instructional use by students	96,000	24,000	146,000	27,000

IF YOUR SCHOOL DOES NOT USE COMPUTERS FOR INSTRUCTION IN THE 1981-82 SCHOOL YEAR, SKIP TO QUESTION 6.

2. Within the total computer time allocated for instruction on each type of computer unit, check the relative amount used for each purpose. Exclude instructional use outside regular school hours from your estimate.

Instructional purpose	% schools w/micros: Relative amount of microcomputer time				% schools w/terminals: Relative amount of terminal time			
	Major	Moder-ate	Little	None	Major	Moder-ate	Little	None
A. Compensatory/remedial (for students below grade level)	14	25	28	32	12	13	27	47
B. Basic academic skills (e.g., arithmetic, language arts; for students at or above grade level)	19	30	28	23	13	24	23	40
C. Learning enrichment in specific subject areas (e.g., science, math, social studies; check the amount for all learning enrichment and specify the primary area)	19	35	30	16	24	29	22	25
D. Computer literacy (introduction to computer concepts; exclude computer science)	33	31	21	15	22	27	18	32
E. Computer science	23	16	24	37	34	22	10	34
F. Other (check the amount for all other instructional purposes and specify the primary one)								

3. A. Estimate the total number of students using computers for instruction in the 1981-82 school year 4,711,000

B. Estimate the total number of computer hours in use for instruction in the 1981-82 school year 4,579,000

Exclude instructional use outside regular school hours from your estimate. Assume 36 school weeks/year.
Total number of hours/computer = (hours in use/day) x (days in use/week) x (weeks in use/year).
Calculate for each computer unit and sum across all.
e.g., 1 microcomputer @ 2 hours/day x 5 days/week x 36 weeks/year = 360
1 terminal @ 5 hours/day x 4 days/week x 24 weeks/year = 480 Total = 840

4. A. How many classroom teachers are highly trained to teach computer literacy (introduction to computer concepts)? 37,600 moderately trained? 55,000 minimally trained? 122,000

B. How many credits can students in your school earn in computer literacy (introduction to computer concepts)? _____

How many credits can students in your school earn in computer science? _____

QUESTION 5 APPLIES TO MICROCOMPUTERS ONLY

5. A. Rate your school's need for microcomputer courseware/software for each instructional purpose.

B. Indicate how much microcomputer courseware your school obtains from each of the sources listed below.

Percent of schools with micros

Instructional purpose	Need for microcomputer courseware/software: Major	Moder-ate	Little or none
a. Compensatory/remedial	38	39	23
b. Basic academic skills	37	50	13
c. Learning enrichment	46	44	10
d. Computer literacy	46	36	18
e. Other (same as Q2F)			

Source of microcomputer courseware/software	All or most	Some	Little or none
a. Publishers	26	34	39
b. Equipment vendors	21	36	42
c. Within your school/ school district	18	34	47
d. Other education agencies	12	32	56
e. Other			

6. For each need listed below, enter a check to indicate the degree of importance in initiating or improving computer-based education in your school.

Percent of all schools

Need	Importance of need: Major	Moder-ate	Little or none
A. Start-up assistance	49	24	26
B. Qualified teachers	50	28	21
C. More microcomputers	63	18	18

Need	Importance of need: Major	Moder-ate	Little or none
D. Suitable courseware	62	20	17
E. Staff/community support	41	31	27
F. Other (specify)			

7. Are you responding for a Title I school? Yes 44,000 No 37,000

What percent of graduates go to college? _____ Not applicable (no 12th grade) _____

Person completing this form: Name _____ Title _____

School _____ State _____ Phone ( ) _____

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